# Open Source Software and Virtualization

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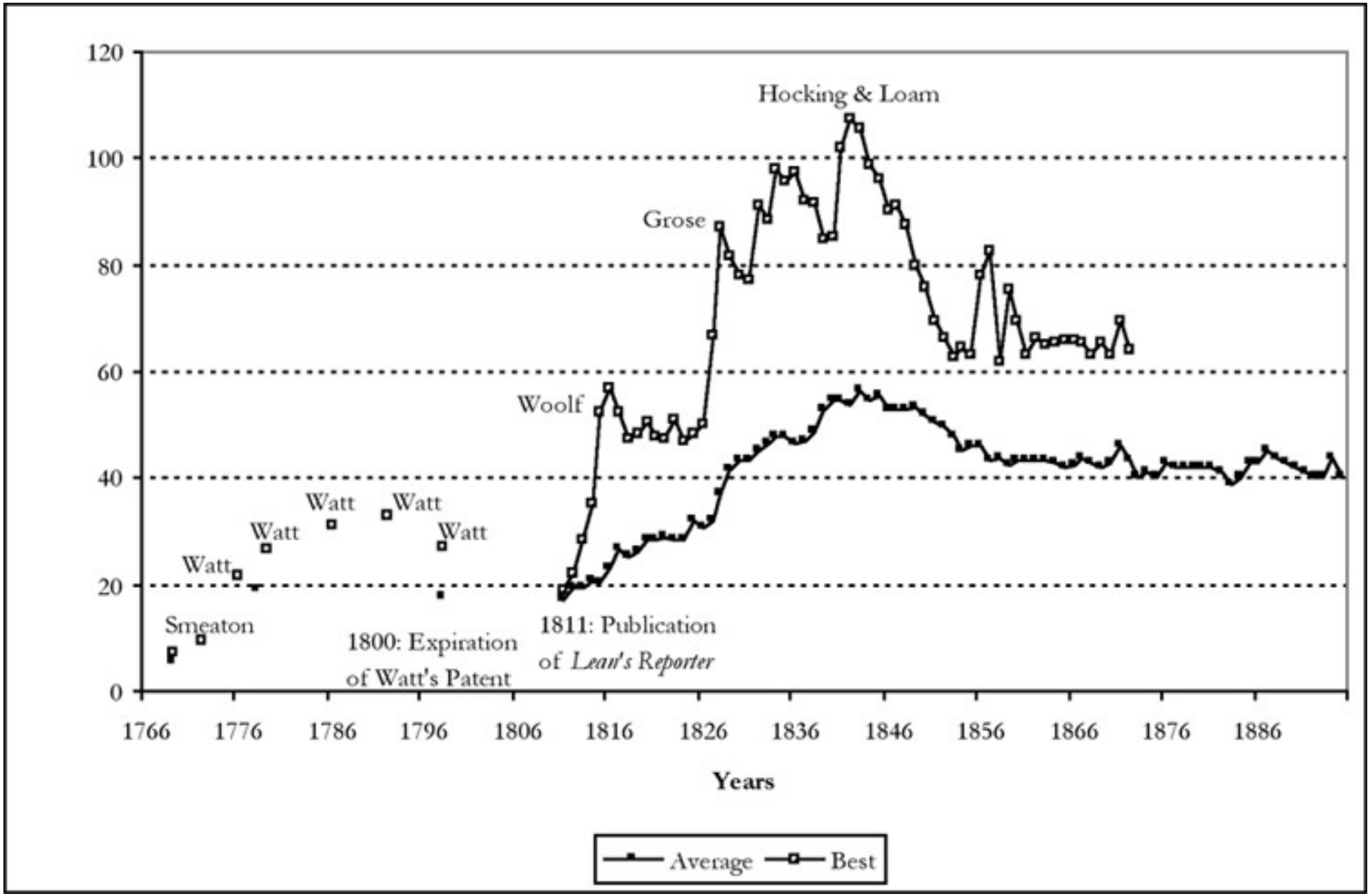
**Lead Architect, Red Hat Government**

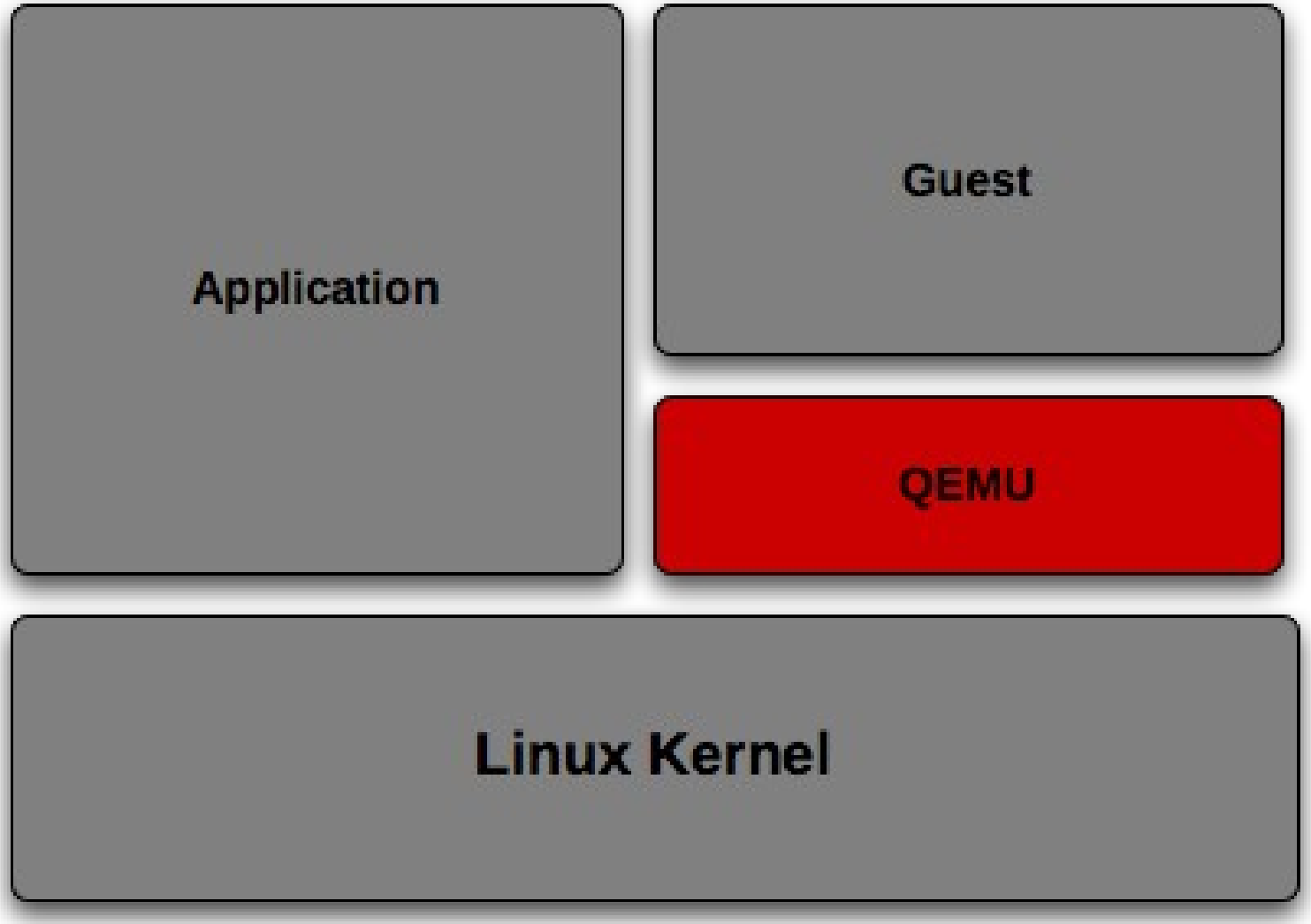


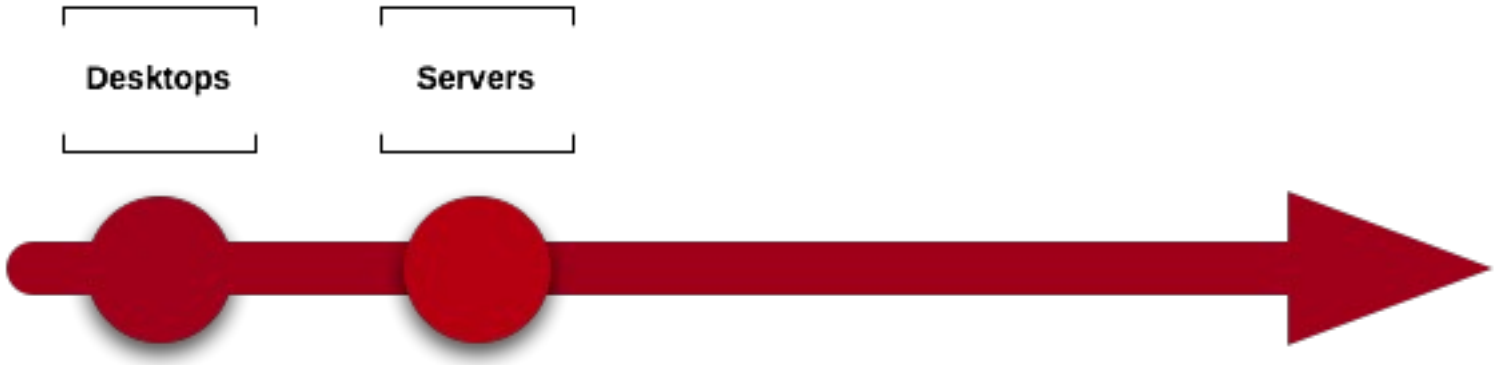

Nuvolari (2004), http://www.firstmonday.org/ISSUES/issue10_10/nuvolari/


Desktops

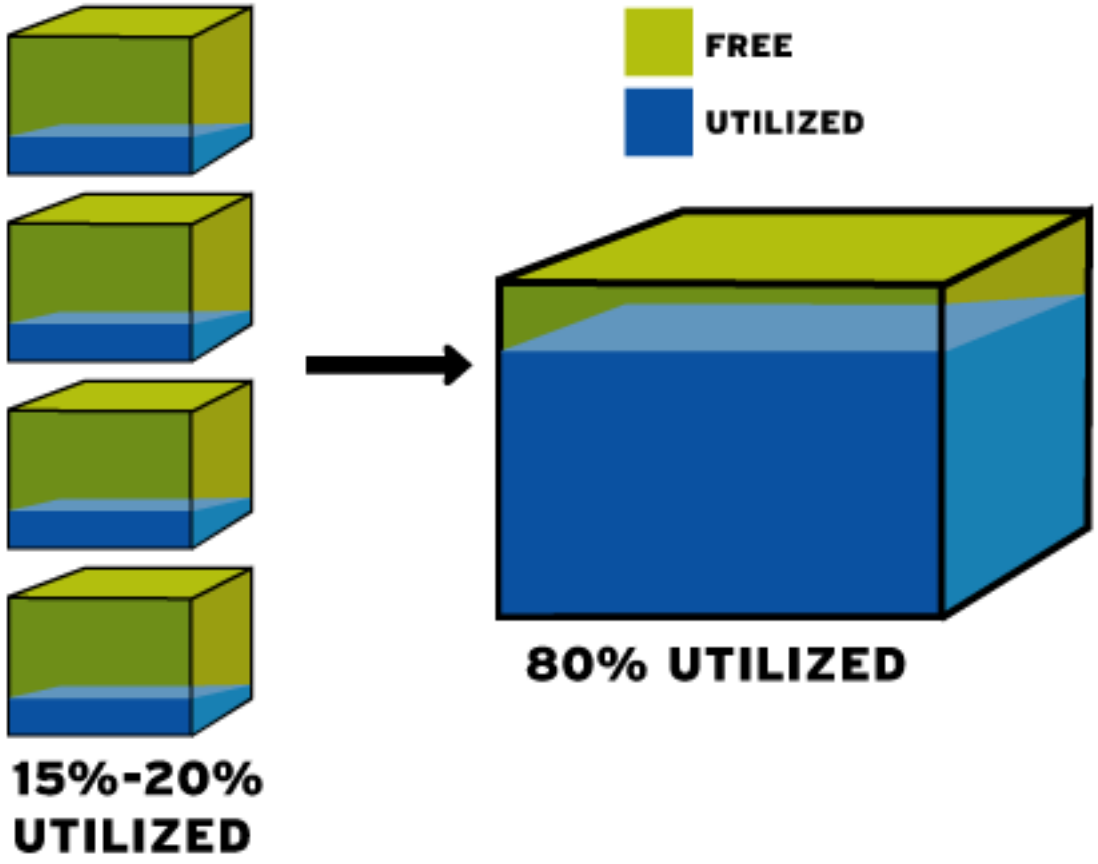
# Desktop Virtualization

- Largely for test and development environments
- Popular with hobbyists
- Performance was not important
- Where virtualization methods were perfected
- Proprietary
  - VMware Workstation
  - Connectix VirtualPC
- Open Source
  - UML (since Linux 2.2)
  - QEMU (complete processor emulator)
  - Lguest (~5k lines of code)
  - FreeBSD Jails, OpenVZ (like Solaris Zones)

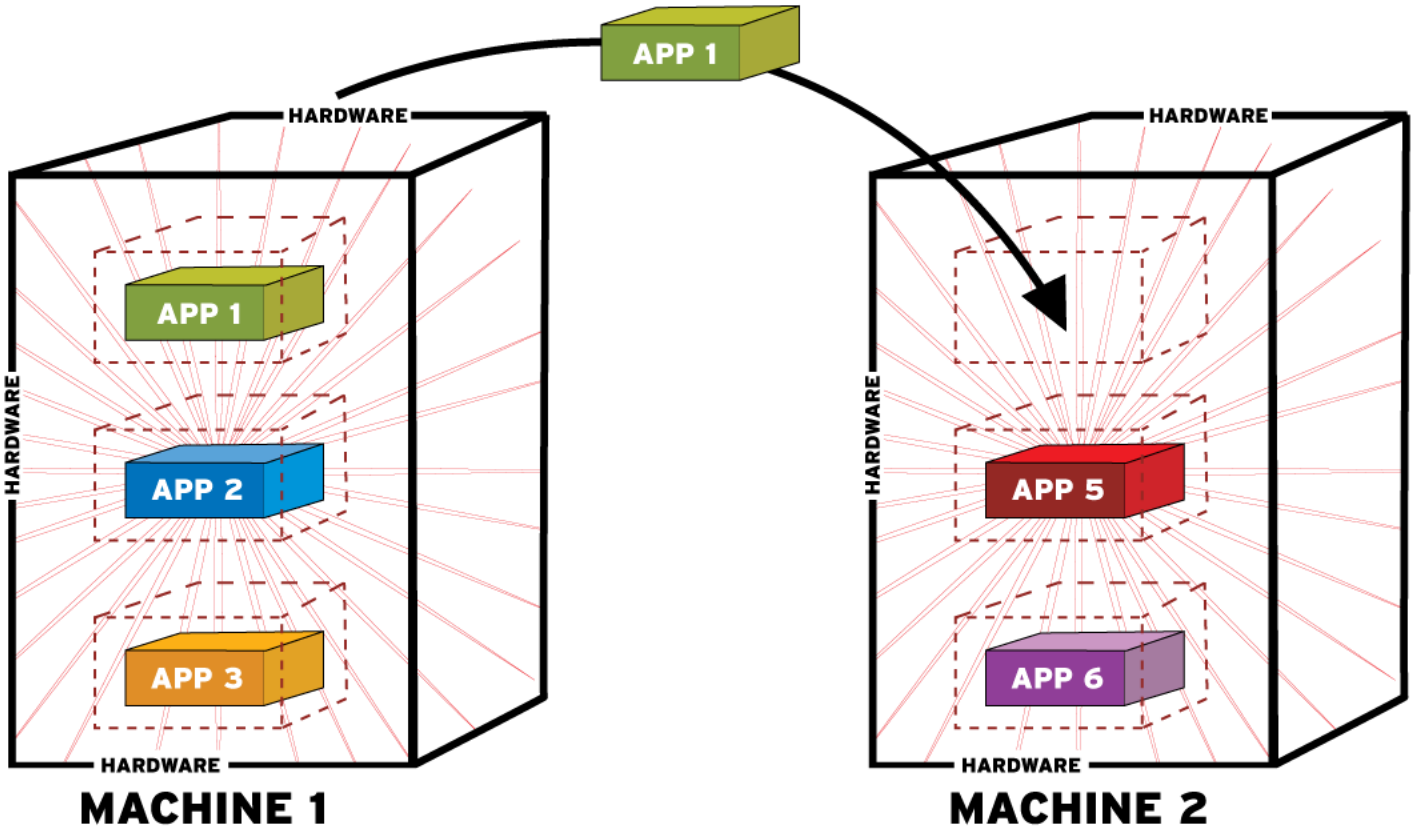

Application
Guest
QEMU
Linux Kernel


Desktops
Servers

# Server Virtualization: Efficiency



# Server Virtualization: Agility



# Server Virtualization

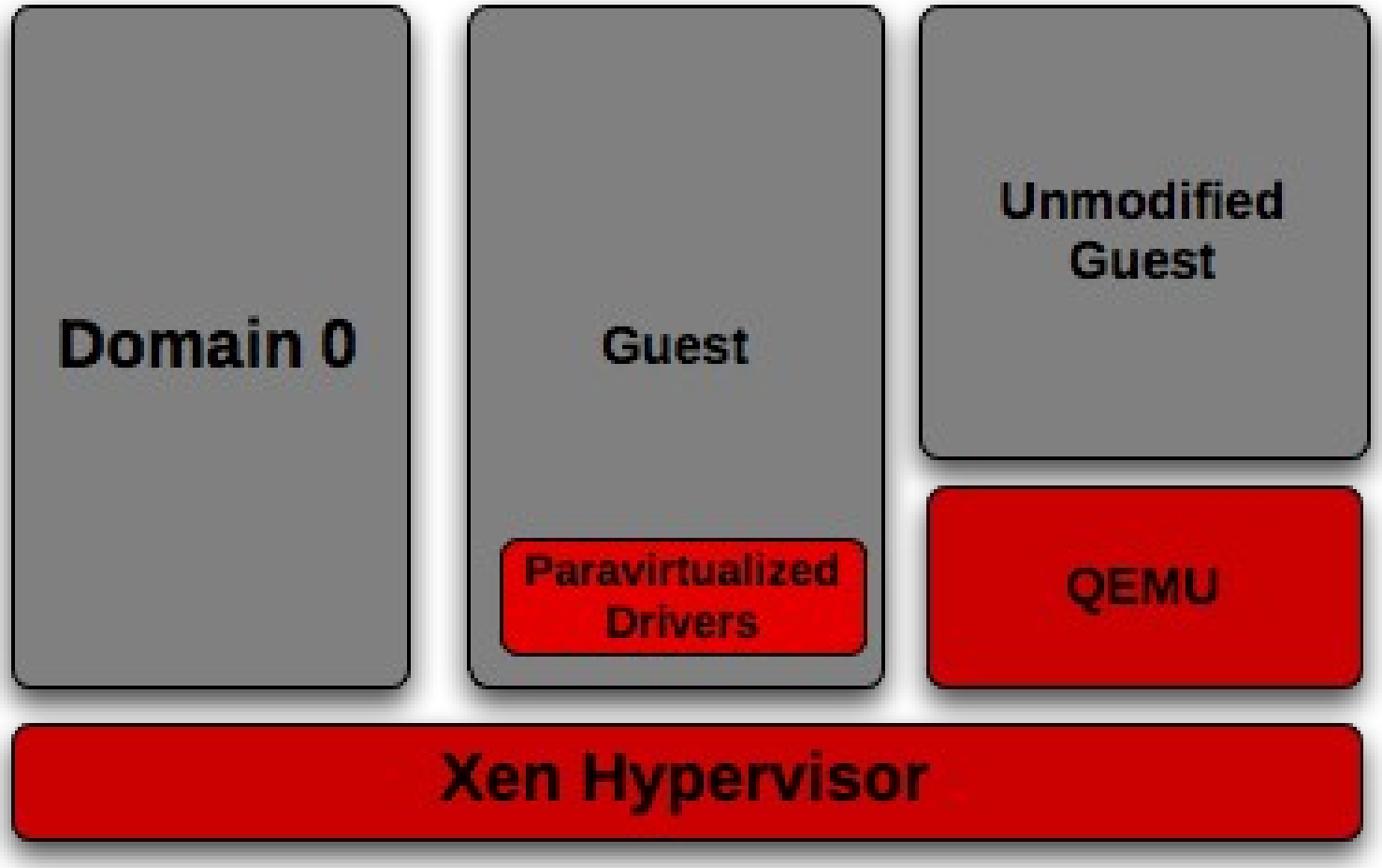
- Good
  - Does not create a purchasing event for new systems
  - Increases efficiency of the hardware
  - Improves agility through live migration
- Bad
  - Poor performance in some use cases
  - High cost, so deployments limited to high consolidation rates: 10-20 guests per box
  - Another vendor, another lock-in
- Proprietary
  - VMware ESX, Microsoft Hyper-V

# Open Source is Everywhere

- VMware and Linux

- Citrix XenSource and Xen
- Microsoft agreement with XenSource
- Red Hat and Xen
- Novell and Xen
- Sun and Xen
- Oracle and Xen

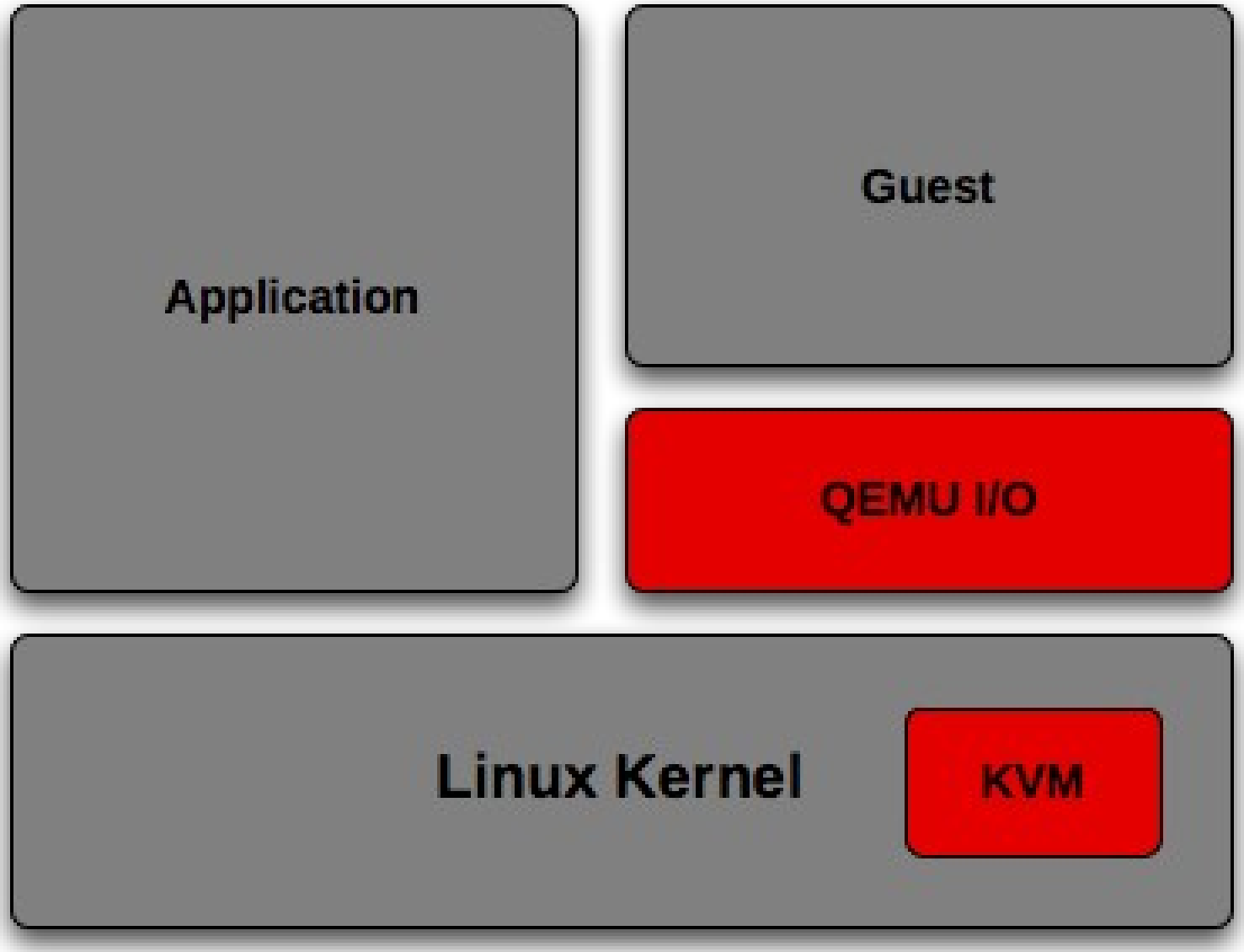
Maybe we should take a look at Xen.


Domain 0
Guest
Paravirtualized Drivers
Unmodified Guest
QEMU
Xen Hypervisor

# Xen Virtualization

- Good
  - Great community
  - Outstanding performance, even on heavy I/O
  - Excellent hardware support
  - No vendor lock-in
- Bad
  - Maintenance headaches
  - Needs a modified OS to shine

This seemed intractable, until the OSS community came to the rescue.


Application
Guest
QEMU I/O
Linux Kernel
KVM

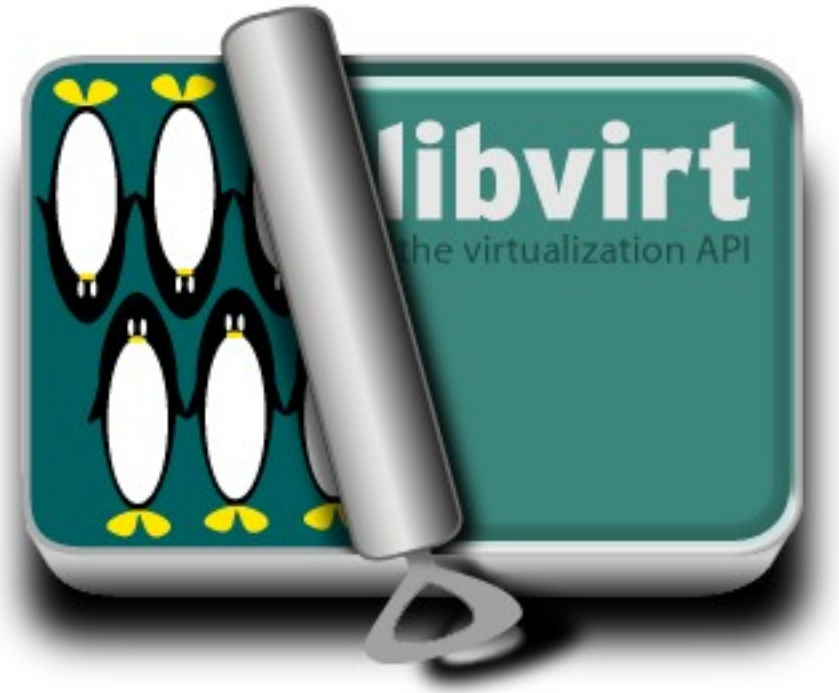
# KVM Virtualization

- Good
  - Great community
  - Outstanding performance, even on heavy I/O
  - Excellent hardware support
  - No vendor lock-in
  - **Integrated with Linux kernel**
- Bad
  - ~~Maintenance headaches~~
  - ~~Needs a modified OS to shine~~

But how do we handle Xen and KVM?

# libvirt

- A common management API for hypervisors
- Near-total adoption: Novell, Red Hat, Sun, Oracle, etc.
- Eliminates hypervisor lock-in

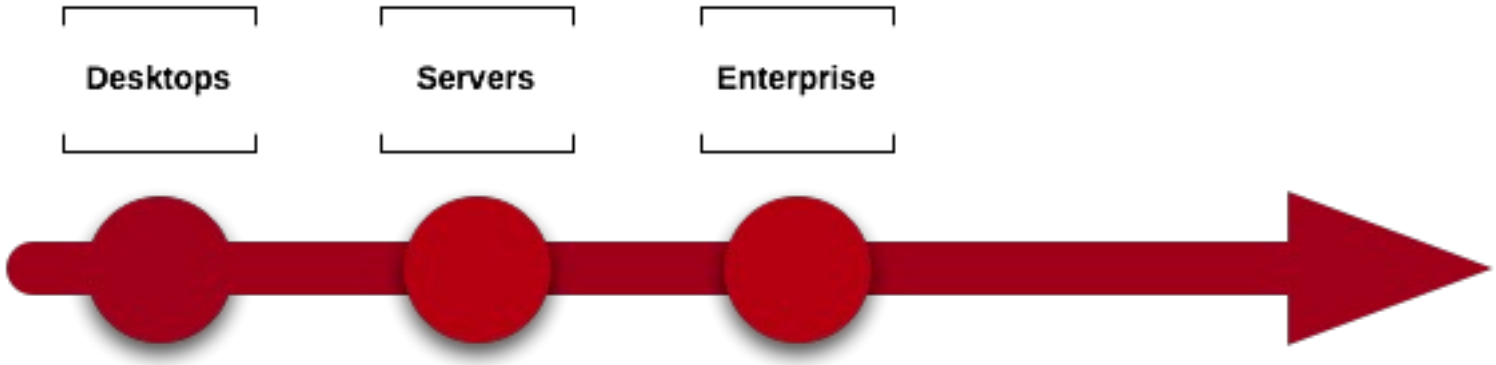


# A word on standards

- Hypervisors are being commodified
- Libvirt provides a standard interface for interacting with hypervisors, so there's a level playing field for management tools.
- DMTF CIM management standard has a Server Virtualization, Partitioning and Clustering schema.
- libvirt-CIM project provides the CIM interface to any hypervisor via libvirt

# Server Virtualization, Redux

- Bad
  - Poor performance in some use cases
    - Fixed: Paravirtualization
  - High cost, so deployments limited to high consolidation rates: 10-20 guests per box
    - Fixed: Integration of the OS and hypervisor
  - Another vendor, another lock-in
    - Fixed: Libvirt, CIM disentangle the hypervisor from the management tools


Desktops
Servers
Enterprise

# What does a hypervisor need to do?

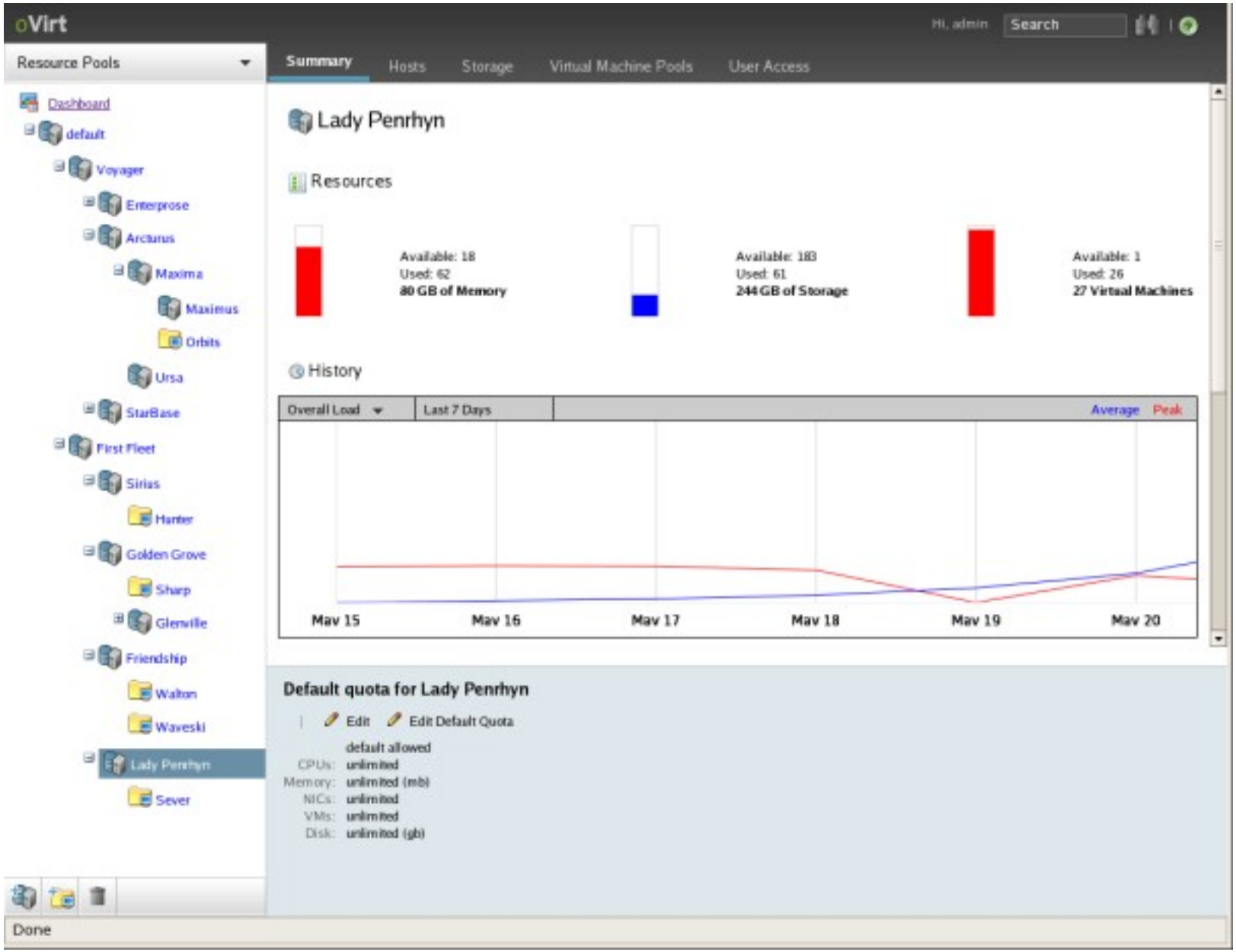
- Access and manage hardware
- Control resources
- Manage memory
- Manage processes
- Handle security

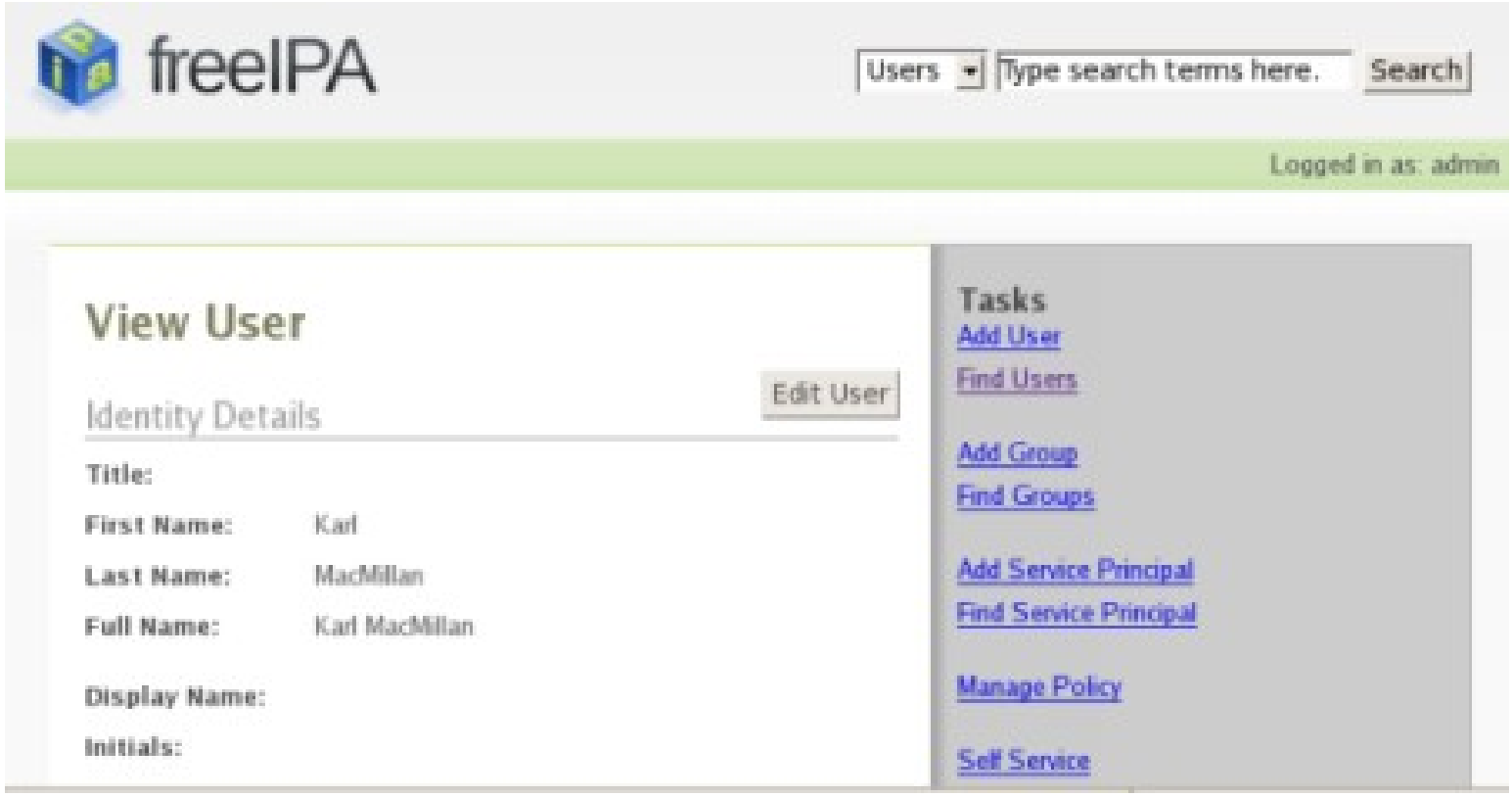
Sounds like an OS to me.

# Convergence

- Let's use our existing OS tools to manage hypervisors.
- We spent the last 10 years eliminating vendor lock-in on servers, why turn back now?

Open source projects are already leveraging existing OS infrastructure to manage virtual guests.


oVirt
Hi, admin
Search
Resource Pools
Summary
Hosts
Storage
Virtual Machine Pools
User Access
Dashboard
default
Voyager
Enterprose
Arcturus
Maxima
Maximus
Orbits
Ursa
StarBase
First Fleet
Sirius
Hunter
Golden Grove
Sharp
Glenville
Friendship
Walton
Waveski
Lady Penrhyn
Sever
Lady Penrhyn
Resources
Available: 18
Used: 62
80 GB of Memory
Available: 183
Used: 61
244 GB of Storage
Available: 1
Used: 26
27 Virtual Machines
History
Overall Load
Last 7 Days
Average
Peak
May 15
May 16
May 17
May 18
May 19
May 20
Default quota for Lady Penrhyn
Edit
Edit Default Quota
default allowed
CPUs: unlimited
Memory: unlimited (mb)
NICs: unlimited
VMs: unlimited
Disk: unlimited (gb)
Done


freeIPA
Users
Type search terms here.
Search
Logged in as: admin
View User
Edit User
Identity Details
Title:
First Name: Karl
Last Name: MacMillan
Full Name: Karl MacMillan
Display Name:
Initials:
Tasks
Add User
Find Users
Add Group
Find Groups
Add Service Principal
Find Service Principal
Manage Policy
Self Service

homebase | cluster | storage

clusters

- Cluster List
- Create
- Configure

## Choose a cluster to administer

**Cluster Name:** testing

Start this cluster | Go

- **Status:** Not Quorate
- **Total Cluster Votes:** 0
- **Minimum Required Quorum:** 1

**Nodes**

- draco.lab.boston.redhat.com
- pleiades.lab.boston.redhat.com

**Services**

- No Services Defined

---

**Cluster Name:** alpha_cluster

Stop this cluster | Go

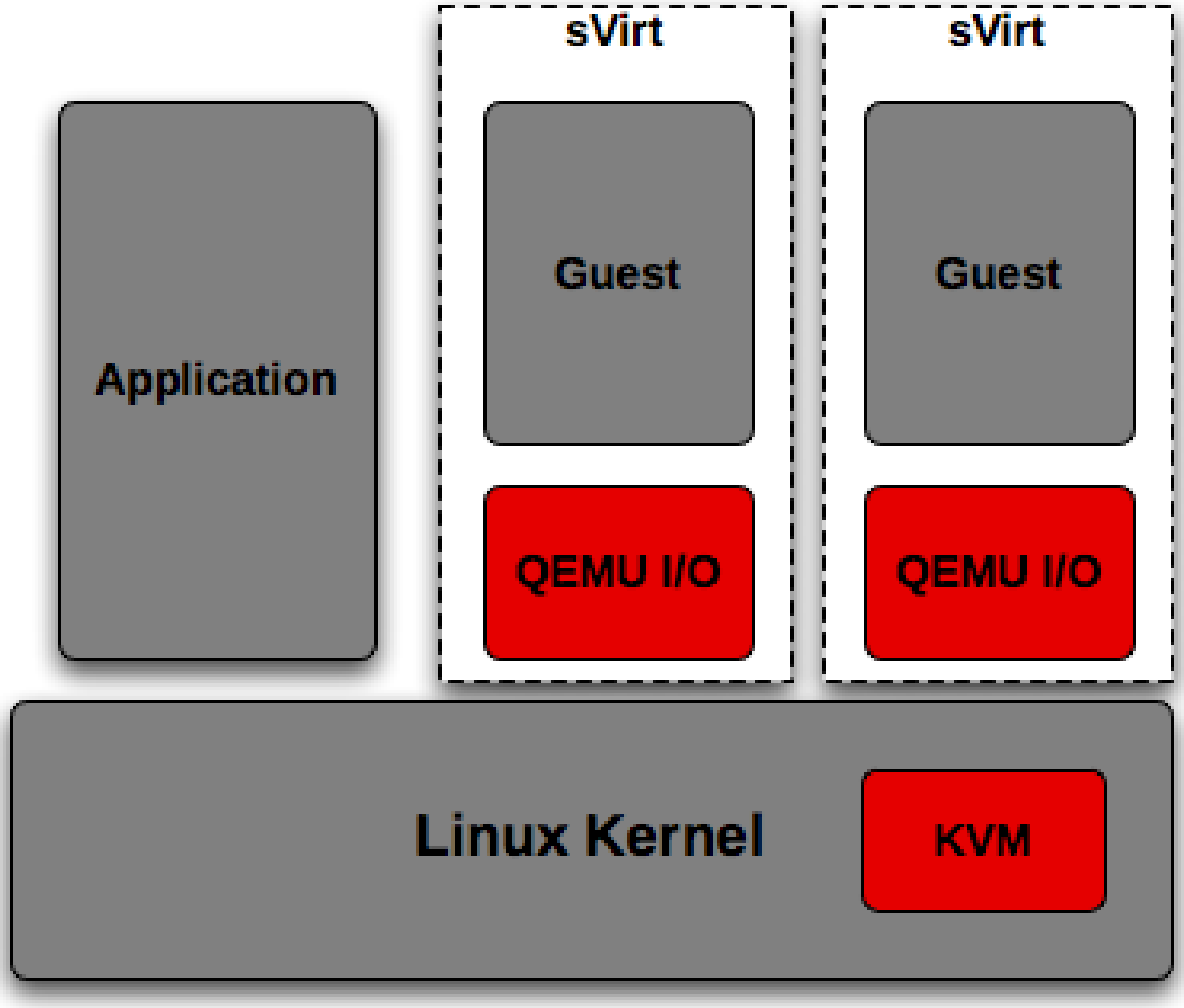
- **Status:** Quorate
- **Total Cluster Votes:** 3
- **Minimum Required Quorum:** 2

**Nodes**

- asterope
- maia
- merope

**Services**

- nested_test
- tester
- web_service


sVirt
sVirt
Application
Guest
Guest
QEMU I/O
QEMU I/O
Linux Kernel
KVM

# Virtualization and OSS

- OSS allows us to use the tools we've already built.
- OSS ensures interoperability and eliminates lock-in.
- OSS is innovating at an incredible rate.

I can't wait to see what happens next.

**Thank You.**